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By AMY P. LESHER

(This section will be resumed soon—Editor)

SOLAR OBSERVATIONS

[Meteorological Research Division, EDGAR W. WOOLARD in charge]

SOLAR RADIATION OBSERVATIONS, FEBRUARY, 1940

By IRVING F. HAND

Measurements of solar radiant energy received at the surface of the earth are made at nine stations maintained by the Weather Bureau, and at ten cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Washington, D. C., Madison, Wis., Lincoln, Nebr.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau stations at Washington and Madison.

The geographic coordinates of the stations, and descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data, obtained up to the end of 1936, will be found in the MONTHLY WEATHER REVIEW, December 1937, pp. 415 to 441; further descriptions of instruments and methods are given in Weather Bureau Circular Q.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Madison and Lincoln the observations are made with the Marvin pyrheliometer; at Washington and Blue Hill they are obtained with a recording thermopile, checked by observations with a Marvin pyrheliometer at Washington and with a Smithsonian silver disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

Table 2 contains the average amounts of radiation received daily on a horizontal surface from both sun and sky during each week, then departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the records of the Eppley pyrheliometer recording on either a microammeter or a potentiometer.

During the latter part of 1939 a broken Eppley pyrheliometer was replaced with a new one of the same type at New Orleans. In order to completely modernize the pyrheliometric equipment at Tulane University, Dr. Laurens also replaced the now obsolete Richard microammeter with a Leeds and Northrup recording microamax potentiometer. All apparatus was thoroughly calibrated to retain the proper pyrheliometric standards.

Direct radiation intensities averaged considerably above normal at Washington and close to normal at Madison, Lincoln, and Blue Hill.

Total solar and sky radiation was below normal at all stations except Washington, Lincoln, New York, Fairbanks, Miami, Blue Hill, Newport, and Friday Harbor. In general the coastal stations received more sunshine than did the inland sections.

No polarization observations were obtained at Madison, owing to continual snow and ice cover.

TABLE 1.—*Solar radiation intensities during February 1940*

[Gram-calories per minute per square centimeter of normal surface]

Date	Sun's zenith distance										
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									Local mean solar time
		A. M.				P. M.					
	e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
WASHINGTON, D. C.											
Feb. 3	1.78				1.58						2.16
Feb. 15	1.52				1.55						1.52
Feb. 16	1.52		1.14	1.29	1.44						1.45
Feb. 26	1.32		1.22	1.38	1.58						1.32
Means			(1.18)	(1.34)	1.54						
Departures			+.25	+.33	+.33						
MADISON, WIS.											
Feb. 2	1.19			1.19	1.45	1.78					2.16
Feb. 7	2.26			1.13	1.39	1.71					2.49
Feb. 13	1.45				1.40						2.26
Means				(1.16)	1.41	(1.74)					
Departures				−.04	+.04						
LINCOLN, NEBR.											
Feb. 9	0.74							1.20	1.17	1.10	1.32
Feb. 10	1.07	0.93	0.99	1.08							1.96
Feb. 21	1.88				1.37						3.00
Feb. 26	3.00						1.32				1.88
Feb. 27	2.49			1.22	1.40						4.57
Means		(0.93)	(0.99)	1.30	(1.38)		(1.32)	(1.20)	(1.17)	(1.10)	
Departures		±0.	−0.4	+0.13	+.01		−.04	−.04	+.15	+.18	
BLUE HILL, MASS.											
Feb. 1	1.3	1.04	1.13	1.23							1.7
Feb. 3	1.1	(1.02)						1.19	0.90	0.82	1.7
Feb. 4	1.4	1.05	1.13	1.26	1.40	(1.56)					1.5
Feb. 5	1.9						1.12	1.00	.83	.67	2.2
Feb. 6	2.1			.88							3.2
Feb. 8	2.3	.99			1.37		1.30	1.03			2.5
Feb. 9	3.0						(1.35)				1.8
Feb. 12	2.6				(1.22)						3.8
Feb. 16	1.7	.98	1.07	1.17	1.34	(1.50)	1.37	1.22	1.10	.97	2.2
Feb. 17	1.9	.96	1.06	1.19	1.36	(1.53)	1.33	1.17	1.01	.96	3.0
Feb. 22	1.3	.88	1.00	1.12	(1.34)	(1.46)	1.23	(1.05)	(.94)	.83	2.3
Feb. 23	1.5						(.97)	(.85)	(.74)	(.65)	2.4
Feb. 26	1.3	.99	1.09	1.21	1.37	(1.54)	1.40	1.24	1.12	1.03	1.1
Feb. 27	.9	1.10	1.20	1.30	1.40	(1.53)					1.1
Feb. 29	2.0		(.65)	(.78)	(.99)	(1.33)	1.24	1.05	(.88)	.80	1.9
Means		1.00	1.04	1.13	1.31	1.49	1.26	1.09	.94	.84	
Departures		+.07	−.01	+.03	+.02	+.03	−.02	−.06	−.09	−.10	

LATE DATA

BLUE HILL, MASS.

Jan. 1	0.8	0.72	0.85								1.5
Jan. 2	1.5	.47	.54	0.68		1.07		0.67	0.53	0.42	1.6
Jan. 3	1.7	.93	1.04			1.46		1.16	1.06	.95	1.9
Jan. 4	1.9	.90	1.10	1.24		1.58		1.26	1.12	.99	1.5
Jan. 6	1.5			1.12		1.37			1.04	.93	1.5
Jan. 7	.7	1.13	1.22	1.33		1.57		1.32	1.22	1.13	.6
Jan. 9			.95	1.07		1.52			.91	.77	2.0
Jan. 16	1.3	.98	1.11								1.1
Jan. 19	1.8	.54				1.47		1.02	.85	.73	1.3
Jan. 23	.7	.93	1.07	1.22		1.59		1.22	1.07	.98	1.0
Jan. 25	2.4	.87	.96	1.05		1.25			.86	.77	1.8
Jan. 27	1.1	.93	1.03	1.21		1.49		1.12	.95	.90	1.4
Jan. 28	1.3	.95	1.04	1.18		1.48		1.19	1.05	.94	1.5
Jan. 29	1.3	1.03	1.12	1.24		1.52		1.22	1.09	.99	1.4
Jan. 30	1.3			1.21		1.45		1.10	.98	.86	1.3
Jan. 31	1.4	.92	1.03	1.15	1.30	1.46	1.30	1.19	1.08	.98	1.7
Means		.88	1.00	1.14	(1.30)	1.45	(1.30)	1.13	.99	.88	
Departures		.02	0	+.04	+.01	−.01	+.02	−.03	−.05	−.08	

* Extrapolated.